Module 2 Assignment

7nm FinFET Device and Inverter Characterization

Objective

This assignment focuses on characterizing a 7nm FinFET inverter using simulation tools. Participants will extract and analyze key performance metrics and populate a characterization table based on their results.

Instructions

1. Simulate the inverter using the provided SPICE deck (`Inverter.sp`).
2. Modify parameters (W, L) to observe performance variation.
3. Extract the following metrics from simulation results:
   - Switching Threshold Voltage (VTC)
   - Drain Current (Id)
   - Power Consumption (P)
   - Propagation Delay (t_{pd})
   - Gain (Av)
   - Noise Margin (NM)
   - Transconductance (gm)
   - Frequency (f)
4. Fill the values into the table below.

Characterization Table

S.No	W/L (PMOS)	W/L (NMOS)	V_{th} (V)	I_d (A)	P (W)	t_{pd} (ps)	Av	f (Hz)
1								
2								
3								

How to Ensure Unique Results

To make your simulation results unique to you, include the following trick in your SPICE deck:

- Add a dummy voltage source:

  ```
  Vuniq in 0 DC <your_username_ASCII_sum_in_mV>
  ```

  Example: If your username is `kunal`, convert to ASCII (107+117+110+97+108 = 539), then use:

  ```
  Vuniq in 0 DC 0.539
  ```

- This introduces a small offset in simulation, making your result traceable and unique.

Submission

Submit:

- Filled table (screenshot or PDF)
- SPICE deck with unique voltage source
- Plot of VTC, delay, and Id curves

Reminder: Complete this within the first 3 days of the 10-day program to stay on track.